

PARAMBIKULAM WILDLIFE SANCTUARY AND ITS ADJACENT AREAS

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INTRODUCTION

Location, Extent and Topography:

The Parambikulam Wildlife Sanctuary came into existence in 1962, when a small area—Sungam range—was declared a sanctuary. In 1973, more areas were added to it and at present it covers an area of about 235 km² (10°25' N, 76°43' E) in the Palghat District of Kerala at an elevation of 600 metres above sea level. On the east it is contiguous with the Anamalai Wildlife Sanctuary of Tamil Nadu; on the north-west it is bordered by the Nelliampathy reserves of Nemmara Division and on the south-west and south by the Vazhachal and Sholayar range respectively, of the Chalakudy Division.

Sholayar is contiguous with Parambikulam on the south and is separated from Parambikulam by a lofty ridge; the highest peak, the Karimalagopuram, has an elevation of 1,440m.

Sholayar range has an area of 15,513.60 hectares, of which 1,820.73 hectares have been leased out for Sholayar Dam and also for tea estates. The rest is reserved forest. The whole area is hilly in character with numerous rolling hills, peaks and cliffs.

There are three dams inside the sanctuary area; Parambikulam, Thunakadavu and Perivarapallam dams (Table 1).

TABLE 1

DETAILS OF THE DAMS IN PARAMBIKULAM

Name of dam	Waterspread area	Catchment area
Parambikulam dam	21.29 Sq. Km	230.51 Sq. Km
Thunakadavu dam	4.34 Sq. Km	43.36 Sq. Km
Perivarapallam dam	2.90 Sq. Km	15.80 Sq. Km

The two major river valleys in the area are of the Parambikulam and Sholayar rivers which converge at Orukombankutty and flow into the main Chalakudy river. Parambikulam drains the southern portions of the Nelliampathy reserve while the Sholayar drains the further reaches of the Adirapalli reserve.

The only approach to the sanctuary by road is from Pollachi, about 48 km from Thunakadavu, the headquarters of the sanctuary. This road passes through the top slip area of the Anamalai Sanctuary. The proposed Chalakudy-Vazhachal-Parambikulam road would increase the accessibility from Kerala side. However, this would also give more opportunity for poaching. A unique forest tramway was in existence here from 1907 solely meant for timber transport from Parambikulam to Chalakudy. Later on it was found that the annual expenditure for maintaining the tramway was quite high and it was a problem to supply sufficient quantity of timber for transport by the tramway in order to enable it to be worked without loss. Extensive extraction of timber

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took place during this period and finally a stage was reached when timber had to be extracted to maintain the Tramway! Finally, after several years, it was abandoned. However, the tracks, if properly maintained, would be a blessing to naturalists for watching birds and viewing animals.

HABITAT AND VEGETATION

Parambikulam Wildlife Sanctuary has a wide variety of habitats, both natural and man-made. The former consists of evergreen and moist deciduous forests, grassy hills and swampy areas, locally known as Vayals which are very common. The Vayals are generally surrounded by hills and forests and as the drainage in this area is particularly poor, there is an accumulation of clayey loam resulting in a semi-marshy condition. Grass grows luxuriously in this area and elephants and gaur are greatly attracted to this habitat. Man-made habitats in this area are derived mainly from Teak plantation. Eucalyptus is also raised and Tapioca cultivated in newly felled areas.

The vegetation of Parambikulam which has been studied by Sebastine and Ramamurthy (1966) is a combination of Malabar and Deccan elements. Malabar elements occur in the evergreen patches mainly in the valleys and moist regions of the area. In Sholayar the vegetation is mainly evergreen. Deccan elements are dominant in the moist deciduous forest. *Cullenia exarillata*, *Myristica fragrans*, *Hydnocarpus wightiana*, *Dillenia* sp., *Aporosa lindleyana*, *Cinnamomum* sp., *Herpullia arborea*, *Hydnocarpus laurifolia*, *Diospyros assimilis*, *Diospyros malabaricum*, *Adinosa* sp., *Baccaurea courtallensis*, *Machilus macrantha*.

Vateria indica, *Mesua ferrea* are common in the evergreen forests while *Adina cordifolia*, *Careya arborea*, *Grewia tiliaefolia*, *Pterocarpus marsupium*, *Dalbergia latifolia*, *Melia* sp. are common in moist deciduous forest. *Clerodendron infortunatum*, *Fluggea* sp., *Glycosmis pentaphylla*, *Helicteres isora*, *Lantana camara* and *Randia dumetorum* are common undergrowth in moist deciduous forest. *Lantana* grows thickly in cleared areas and lush growth of *Eupatorium* was noted in Teak plantations, especially where the plantation has failed.

Plantation:

Parambikulam was one of the typical teak areas of the State and the best natural teak was found in this region. But the extensive extraction during the last several years has depleted this area of its once famous teak and rosewood. The first plantation in this area was raised about 1912. The majority of the plantations lie along the first section of the tramway line where clearfelled areas had been regenerated artificially with teak. All the plantations after 1932 were raised under taungya system. Eucalyptus is also planted here on a small scale. At present, 100 Sq. Km of the sanctuary are under plantation.

WILDLIFE

Parambikulam Wildlife Sanctuary and the Sholayar area have almost all the representative Peninsular Indian animals, (Table 2). Pug marks of 6 tigers, 3 in Parambikulam sanctuary and 3 inside Sholayar range, were seen. Apart from tiger, the other endangered species seen here are Liontailed macaque and Nilgiri tahr, 76 of the former and 32 of the latter were recorded from the sanctuary area.

TABLE 2

ANIMALS RECORDED FROM PARAMBIKULAM/SHOLAYAR AREA

Species	Seen	Heard	Spoor	Remarks
<i>Presbytis johni</i> (Nilgiri Langur)	238	5	—	—
<i>Macaca silenus</i> (Liontailed macaque)	76	1	—	—
<i>Macaca radiata</i> (Bonnet macaque)	29	—	—	—
<i>Panthera tigris</i> (Tiger)	—	—	6	3 at Parambikulam 3 at Sholayar.
<i>Panthera pardus</i> (Panther)	—	—	2	Both at Parambikulam.
<i>Paradoxurus hermaphroditus</i> (Toddy cat)	—	—	1	Sholayar.
<i>Herpestes edwardsi</i> (Common Mongoose)	1	—	—	Moist deciduous forest, Parambikulam.
<i>Cuon alpinus</i> (Wild dog)	—	—	2	Droppings at two places Evergreen forest.
<i>Melursus ursinus</i> (Sloth Bear)	—	—	5	3 from teak plantation. 2 from open area only dropping.
<i>Lutra</i> sp. (Otter)	2	—	—	—
<i>Martes gwatkinsi</i> (Nilgiri marten)	2	—	—	Sholayar.
<i>Ratufa indica</i> (Giant squirrel)	45	7	—	Various habitats Parambikulam and Sholayar.
<i>Hystrix indica</i> (Porcupine)	—	—	1	—
<i>Elephas maximus</i> (Indian Elephant)	11	—	—	Dung and tracks were not counted.
<i>Bos gaurus</i> (Indian gaur)	40	—	1	—
<i>Hemitragus hylocrius</i> (Nilgiri tahr)	32	—	—	—
<i>Cervus unicolor</i> (Sambar)	13	—	3	2 tracks in Sholayar. 2 killed by wild dog not added.
<i>Axis axis</i> (Spotted deer)	8	—	—	2 fawn seen singly on different days. 6 Ad-M. deciduous forest.
<i>Muntiacus muntjac</i> (Barking deer)	5	5	1	2 at Sholayar.
<i>Tragulus meminna</i> (Mouse deer)	—	—	2	1 dropping 1 hoof mark.
<i>Sus scrofa</i> (Wild Boar)	70	—	—	3 sounders of 12, 40, 15, rest singly.

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NILGIRI LANGUR *Presbytis johni*

238 animals were seen in 30 troops, the largest troop had 11 individuals. 8 solitary individuals were seen. On several occasions the number of individuals in a troop could not be counted accurately because of the inaccessible nature of the terrain. Troops were seen mainly in sholas and moist deciduous forests, occasionally in teak plantation, adjacent to natural forests. They frequent bamboo clumps too. Though there is no data to compare their population, it is felt that their population has decreased considerably. The number of troops seen during my previous visit to this area in 1972 was apparently higher. Illegal poaching of this protected species from the remotest part of the sanctuary is still going on, as reported by local inhabitants. Habitat destruction is the other major cause affecting their population.

largest 17. The former was in a small patch of evergreen forest on the western slope of Vengoli mudi near Thunakadavu reserve. This population appeared to be an isolated one since this patch of forest is surrounded by bamboo forest and I saw no indication that they move through bamboo.

The call of Liontailed macaque was heard from Karimalagopuram, but the troop could not be traced. A troop was reported from this area by the Wildlife guides, a month after my observation.

All the 7 troops were seen in evergreen forests. *Cullenia exarillata* was common in all these areas. In Sholayar the trees were in flower during the period of observation and the animals ate the fruits and at times the flower.

Steven Green in his survey of Liontailed macaque has not reported the occurrence of this species in Parambikulam/Sholayar area.

TABLE 3

DISTRIBUTION OF LIONTAILED MACAQUE IN PARAMBIKULAM/SHOLAYAR AREA

Location of Sightings	No. of individuals	No. of Troops
Vengoli mudi shola	8	1
Kuriyarkutty	17	1
Orukombankutty	13	1
Border of Vazhachal and Orukombankutty	10	1
Sholayar range	28	3 (8+11+9)
Total seen	76	

LIONTAILED MACAQUE *Macaca silenus*

76 were seen in 7 troops; 4 troops in Parambikulam area and 3 in Sholayar area (Table 3). The average troop size is 10.8. The smallest troop contained 8 individuals and the

NILGIRI TAHR *Hemitragus hylocrius*

Tahr was observed at three places. Vengoli peak, Karimalagopuram and Pandaravaramalai. Pandaravaramalai is on the east of Parambikulam and largely falls within the Anamalai Sanctuary. Altogether 32 Tahr were seen (Table 4).

TABLE 4

DISTRIBUTION OF NILGIRI TAHR IN PARAMBIKULAM AREA

Vengoli peak	18 One Saddleback
Karimalagopuram	5 1 FY, 1 Saddleback, 1 Brown Buck
Pandaravaramalai	9 No Saddleback was noted.

Gun shots were heard frequently from the foothills of Karimalagopuram, on the northern side, where Tapioca is cultivated intensively. It is said to be to scare away the crop-raiding animals!

TIGER *Panthera tigris*

Pug marks of three tigers were seen inside Parambikulam Sanctuary area and three in Sholayar area. Of the three in Parambikulam, one was seen near a shola in Anapadi beat. Droppings were also seen here and contained Sambar hair. Two of the pug marks were seen in Thellickal beat, both on the road to Parambikulam from Thellickal Rest House, between teak plantations. Of the three pug marks seen in Sholayar area, one was of a large animal.

ELEPHANT *Elephas maximus*

Altogether 11 elephants were seen. Out of the 4 Tuskers noted, one was a single tusker and one other had its tail broken. One calf was also seen. Elephants seemed to prefer teak plantations to natural forests during the period of observation.

GAUR *Bos gaurus*

Of the 41 gaur seen, one herd of 12 and another of 15 were recorded at different places. Three gaur were seen once in a bamboo

ings were not as contrasty as in the solitary bulls. In the herd of 15, 6 were calves, 2 were adult bulls and the rest females. Largest herd was seen in 'Vayals'. (Table 5).

NILGIRI MARTEN *Martes gwatkinsi*

A pair of this Mustelid carnivore was seen in the Sholayar area, while the animals crossed a road about 10 ft. away from me. There is no recent record of this animal from Kerala.

AVIFAUNA

The Parambikulam/Sholayar area is very rich in bird life. 133 species were observed during the period of observation (See List Appendix I).

Frogmouth (*Batrachostomus moniliger*) was not recorded earlier from this area. The last authentic record of this bird in Kerala (at Thattakad) was in 1937, by Dr. Sálim Ali. The bird was seen on two consecutive days in a bamboo thicket and was observed very closely. A photograph could not be taken owing to poor light condition. Since the plumage of the bird was cryptic and merged with the surroundings, the bird could not be made out till it moved. The breeding of Dollar bird (*Eury-stomus orientalis*) was recorded at Kuriarkutty and also at Periya shola. Open areas with scattered trees and shrubs, near water holes, surrounded by forest is its typical habitat. Nests of *Monarcha azurea*, *Dicrurus aeneus*, *Dicrurus hottentottus* were also observed during the study.

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TABLE 5

DETAILS OF GAUR OBSERVED IN THE SANCTUARY

Place	Total seen	Herd	Bull	Cow	Calf	Habitat
VENGOLI MUDI PEAK			—	11	1	Moist deciduous forest. Bamboo abundant.
EASTERN SHOLA OF VENGOLI PEAK	1	—	1	—	—	Bamboo.
THELICKAL	15	1	2	7	6	Vayal.
KACHITHODU	3*	—	—	—	—	Scrub and Bamboo Vegetation.
THELICKAL	1	—	1	—	—	Near stream. Teak plantation.
KARIMALAGOPURAM	2	—	2	—	—	Grassland near Shola.
LEFT SIDE OF EASTERN DAM	4**	—	—	—	—	Grass & Bamboo—Wet swampy area.
KURIYARKUTTY	1	—	1	—	—	Moist deciduous forest.
PANDARAVARAMALAI	2	—	2	—	—	Grassland.
			Solitary			
			Solitary			
	41	2	9	18	7	

* Could not recognise sex, as I got only a fleeting glimpse.

** Could not recognise the sex as they were seen at a long distance.

MANAGEMENT

The administrative set up of the sanctuary is:

- DFO : Local Administrative Head
- One Assistant Wildlife Preservation Officer : Next to DFO
- 3 Foresters : One each for Thekkady, Thunakadavu and Parambikulam.
- 4 Guards : One each for Thunakadavu, Parambikulam, Kuriyarkutty, and Orukombankutty.
- 3 Watchmen: One each for Thunakadavu, Orukombankutty and Kuriyarkutty.

There was no guard or watchman for the Thekkady area. The Watchman and Guard posted for Orukombankutty area were never to be seen there, as they did not stay there due to the absence of accommodation and other facilities. Considerable poaching of animals was reported from Thekkady and Orukombankutty area.

There were also two Wildlife Guides stationed at Thunakadavu during the study period.

WILDLIFE MANAGEMENT

There is no management system as such. The vaccination of cattle against Rinderpest and the provision of 16 saltlicks—10 during 1974-75 and the rest in 1976 are perhaps the only attempts at management.

Existing threats to Wildlife in the area

(1) The proposed Kuriyarkutty Project:

The project envisages the construction of three dams; one in Karapara river, one in Pulickalar and a third one in Kuriyarkutty river. It is aimed at irrigating 43,000 acres of land in Chittoor area. The project when completed will have three power house stations with an initial plant capacity of 82 MW. in total (Table 6).

might have suffered very greatly during the construction of these dams, might be in the process of rebuilding. Therefore, a new strain on the ecology of the area will certainly be detrimental to the interest of the remaining wildlife.

Even if the whole Kuriarkutty project consisting of three dams cannot be called off, it is suggested here that the whole project should be reviewed and the possibility of calling off Kuriyarkutty dam which will be inside the

TABLE 6
DETAILS OF THE PROJECT

	Karapara	Pulickalar	Kuriyarkutty
Catchment area	18.48 Sq. MI.	6.24 Sq. MI.	49.50 Sq. MI
Water spread area full Reservoir level	8.75 acres	1200 acres	2950 acres
Full Reservoir level	+3087'	+2425'	+1791'
Type of dam	Masonry gravity	Masonry gravity	Masonry earch

Only Kuriyarkutty dam will come within the limits of the Sanctuary.

Its waterspread area covers most of the forests in Thellickal/Kachithodu area. This area is very rich in Wildlife; pug marks of two tigers were seen here. Though the other two dams would be coming up only in Nelliampathy areas, outside of sanctuary limit, the impact of them on the ecology of the area would be severe, since they are very close to the sanctuary.

Parambikulam already has three dams. Parambikulam, Thunakadavu and Perivarapallam. Though no authentic data are available to show whether the wildlife has diminished after the construction of these three dams, enquiries with local people show that the wildlife population has gone down tremendously, especially the population of elephant and Gaur, owing to the construction of these dams. Theoretically, the population, which

sanctuary limits be considered.

(2) Extraction of Bamboo:

The common bamboo is *Bambusa arundinaceae* which flowers gregariously at long intervals. Licence is issued for the extraction of bamboo; the general norms which are laid for the felling and removal of Bamboo are:

1. "No clump shall be clearfelled except those that have flowered, in which case they shall be clearfelled only during the year following the flowering so that there may be enough time for seed fall and subsequent germination".
2. "The total number of culms removed from a single clump shall not exceed the number of immature shoots present".
3. "The cutting shall be distributed as far as possible over the whole clump.
4. "Culms should be cut as low as possible, and the cut shall always be made above

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the node so as to prevent rainwater collecting in the stumps."

Apart from the fact that these norms are ignored, the magnitude of disturbance caused to the Wildlife is very severe. Movements of workers in the sanctum-sanctorum of the sanctuary and movements of trucks on and off, have detrimental effect on wildlife. Whether the workers poach is anybody's guess.

(3) *Minor forest produce:*

Under this apparently deceptive heading falls cane, reeds, cardamom, honey and wax extraction. Cardamom is extracted mainly from the Sholayar area. The right of collection of the produce is sold in auction to private parties for a year or two. A number of people are employed for the collection, while the removal of reeds, canes, etc., speeds up the habitat shrinkage, the movement of people through the sanctuary scares away the wild animals. Normally the workers live in temporary sheds inside the forest for days together. Their activities form a continuous disturbance to wildlife.

(4) *Taungya system:*

The taungya system was introduced to Kerala in 1922, about 60 years after its origin in Burma. In Parambikulam, all plantations after 1932 were raised under the taungya system. After clearfelling an area, it is planted with seedlings of desired plantation trees and is leased out for cultivation (here it is Tapioca). The apparent advantage of this cultivation is that it prevents weed growth and also offers shade to the seedlings. The ecological disadvantages of this system are:

1. When an area is clearfelled and the logs transported, a major portion of what is due to the soil is lost, decomposition of the plant material not being facilitated.

2. The soil mounts, which are made for planting the tapioca, are the worst affected by erosion during rain.
3. By tapioca cultivation, a major portion of the nutrient of the soil is lost in the form of tapioca tubers.
4. When the crop is harvested, the tubers are pulled out from the soil—the soil becomes very loose and hence vulnerable to erosion by rain.
5. The resultant soil deprived of its vitality, could probably impair the growth of the seedlings.
6. The tapioca plant, which grows fast, often overshadows the seedlings and obstructs light. How far it affects the growth of the seedlings is not known.

The probable effects of taungya on wildlife are:

1. The increased human activities on the taungya land scare away the wild animals.
2. On the pretext of crop protection the taungyadars often keep guns which ultimately lead to ruthless poaching of animals.
3. Tapioca tubers attract rodents in large numbers and provide additional food to them. This abundance of food might lead to their rapid multiplication. When the tapioca is harvested, and the additional food is no more available, these rodents might migrate to the neighbouring areas—probably to villages in search of food. In other words, the population which grew beyond the optimum level due to the addition of food would be expelled as a result of competition from the area when that additional food was no longer available. This population probably migrated to the adjacent villages thereby causing damage to village crops.

4. Wild pigs are also attracted by the tubers of tapioca. The piglets which are born while the tapioca is available, are trained to feed on these and are denied the opportunity of being trained to feed on and search for natural food. This could probably make the piglets less competent to live in the natural condition later on. All these are probable impacts of the taungya system and have to be studied in detail.

Notwithstanding its ecological impacts, the most severe and at the same time, the most obvious impact of taungya on wildlife is the indiscriminate poaching of wild animals by the taungyadars. Therefore, even if with all the potential ecological dangers it is decided to continue the taungya system, it is suggested here that in order to decrease the poaching activities the forest department should themselves undertake the cultivation instead of leasing it out to private parties.

However, stopping this system has a lot of social problems as tapioca is one of the major food items of the poor in Kerala. Therefore, a study on all aspects of this system has to be made.

(5) *Tribal settlement:*

There are four types of tribals in the Parambikulam sanctuary area: Mudukas, Kadas, Mulssers and Mulmalssers. They occupy different areas inside the sanctuary. Mulssers and Mulmalssers are at Katchithodu and Sungam; Kadas at Kuriyarkutty-Parambikulam area and Mudukas opposite to Parambikulam lake; altogether there are about 300 families. During the time of observation, the tribals at Katchithodu were seen collecting bamboo rice. Ground under the bamboo clump was cleared and the rice that fell was collected. Tribals are given land for cultivation at Katchi-

thodu area. This practice has a built-in danger to wildlife. The area is surrounded by forest where wildlife is abundant. Animals often cross the field to the forest on the other side. Therefore, the tribals have to scare away the animals from their crop. Trapping of smaller game like junglefowl is common among these people. It was told that 200 acres of land have been allocated for the tribals for settlement and cultivation. The land selected for this is at Sungam, where wild animals are often seen and this is a severe threat to the wildlife of the area.

(6) *Cattle grazing:*

Cattle are not abundant at Sungam range, but in Parambikulam area they are. Reduction of their number at Parambikulam is necessary.

(7) *Felling:*

Both clearfelling and selection felling were not observed in Parambikulam area during the period of study. But in Sholayar, areas were being marked for selection felling. It is suggested here that no forestry operation should be undertaken in areas lying close to Orukombankutty and Karimalagapuram area of Parambikulam where Liontailed Macaques are common.

(8) *Elephant capture:*

Elephant capture has been going on for years in this area, but has been stopped since 1975. The pits prepared during the operation have been left unfilled and cause accidents to wild animals occasionally. It was reported that once a gaur calf fell into one of the pits, and another time an adult bull. It is suggested that pit capture of elephants should not be restarted and that the pits left by the former operations should be filled.

(9) *Fire:*

Evidences of fire were seen at many places, including areas very close to evergreen forests—areas adjacent to the small patch of evergreen forest on the side of Vengoli peak. Several places on the way to Karimalagopuram, many places at Anapadi were found burnt. Fire inside the teak plantations was also rampant. None was natural, but man-made. Man-made fire, unless under control, is very destructive to wildlife and to the general ecology of the area.

(10) *Stray dogs:*

At Thunakadavu, Parambikulam, Kuriyarkutty and Sungam areas stray dogs are abundant. At Thunakadavu, a dog was seen chasing a spotted deer. There is also the danger of transmitting rabies to wild animals.

(11) *Man and Wild Dog kills:*

When a sambar is killed by the wild dogs, the dogs are often chased away and the prey is collected by the local people. On 23rd April, 1976, at Thellickal, very close to the labourers' quarters of the Electricity Board, one Sambar was found killed by wild dogs. It had three small injuries. One on the neck, one below the left eye and another one on the chest. The animal was killed near the Thellickal river and pulled towards the river bed, but the wild dogs were chased away and the kill was collected by the people. I understood that this is the regular practice here. This means the dogs will make an additional kill and in the long run, this type of poaching by man of the wild dogs kills is bound to affect the balance between the wild dog and its prey.

(12) *Poaching:*

No poaching was seen during the period of

observation, but gun shots were heard many times from the Tapioca plantation area. It was learned from reliable people that the tapioca contractors indulge in poaching quite often.

Tourism

The presence of representative peninsular Indian species and the possibility of viewing some of them easily should attract tourists. Endangered species like Nilgiri Tahr and Lion-tailed macaque could be seen within an hour's walk from the main road at Vengoli peak. The giant teak known as Kannymarathekku (50+ metres high and 6 metres girth) which is at least 300 years old, and the Woods Grave—the grave of Mr. Hugh Woods, who was a working plan officer in the 1900's—add to the tourist attraction. Boating facilities though not available at present, could be an additional attraction to tourists.

Accommodation

The only accommodation available inside the sanctuary is at Parambikulam where the P.W.D. of Tamil Nadu has a Rest House with five suites. At present a small bungalow with two suites has come up at Thunakadavu. Tourists could also stay at Topslip area, half an hour drive from Thunakkadavu.

Conveyance

There are no transport facilities in this area. A jeep has been allocated for tourists but would never become available.

RECOMMENDATIONS

1. A thorough analysis of the Kuriyarkutty project by a combined team of Wildlife Biologists and the concerned engineers, is necessary to consider reducing the sub-mergible areas at least inside the sanctuary limits.

2. Stop extraction of bamboos from the sanctuary area.
3. Discourage collection of minor forest products from the sanctuary limits.
4. If taungya system cannot be stopped, it should be undertaken by the forest department to reduce poaching.
5. Discourage the tribals from settling inside the sanctuary area; if this is not possible, remove and rehabilitate them outside the sanctuary.
6. Discourage the granting of land to the tribals for cultivation in the interior of the forest.
7. Reduce the cattle population in Parambikulam while maintaining the present population of cattle in the Sungam area.
8. Discourage selection felling in Sholayar area.
9. Elephant-capture pits should be covered to avoid accidents to other wildlife.
10. Fire lines of standard size should be put and more watchmen should be employed for fire-watching.
11. Stray dogs should be removed from the sanctuary.
12. Stringent measures should be taken against stealing of wild dog kills.
13. Thuthanpara and Karapara beats on the west and the forests lying east of Chalakudy river and north of Vazhachal-Valpara road which include part of the Vazhachal range and part of Anakkayam beat, Sholayar beat and Chandanathodu beat of the Sholayar range on the south should be included in the sanctuary area. Forestry operations or any other disturbance to the habitat in the Thuthanpara and Karapara beat might destroy the

population of Liontailed Macaque in the Orukombankutty area. Pressure to the habitat and population of this macaque from various estates in this area is considerable. Thuthanpara and Karapara beats, if preserved, would act as a buffer zone to the habitat of Macaques in the Orukombankutty area.

Liontailed macaques were observed at Sholayar and Chandanathodu beats of the Sholayar range and also at Kuriyarkutty area of Parambikulam Sanctuary. The forests of Kuriyarkutty and Orukombankutty are separated by Teak plantations. The only possible connection is through the Karapara river valley (I observed one troop here). The other possible connection is perhaps through the narrow isthmus-like projection through teak plantations of Orukombankutty forests where the Parambikulam river and Sholayar river meet. Through this forest connection, the macaques could move to the Sholayar area. Troops in the Kuriyarkutty area will be isolated if forests in the Sholayar-Chandanathodu beats are destroyed. Therefore, Sholayar and Chandanathodu beats and the forests west of it up to Chalakudy river, if included in the Sanctuary and protection offered, the troops of these areas and the troops of Kuriyarkutty and Orukombankutty could mix, interbreed and form a healthy population.

I feel that this sanctuary should not be opened for tourism, but should be preserved for research, and hence no suggestions are made here for the improvement of tourist facilities.

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APPENDIX I

A SYSTEMATIC LIST OF THE BIRDS SEEN/HEARD IN
PARAMBIKULAM/SHOLAYAR AREA

1. Little Cormorant, *Phalacrocorax niger*.
2. Cattle Egret, *Bubulcus ibis*.
3. Night Heron, *Nycticorax nycticorax*.
4. Blackwinged Kite, *Elanus caeruleus*.
5. Common Pariah Kite, *Milvus migrans*.
6. Brahminy Kite, *Haliastur indus*.
7. Shikra, *Accipiter badius*.
8. Indian Crested Hawk-Eagle, *Spizaetus cirrhatus*.
9. Black Eagle, *Ictinaetus malayensis*.
10. Greyheaded Fishing Eagle, *Icthyophaga ichthyaeus*.
11. Crested Serpent Eagle, *Spilornis cheela*.
12. Indian Kestrel, *Falco tinnunculus*.
13. Bush Quail, *Perdica* sp. ?
14. Grey Junglefowl, *Gallus sonneratii*.
15. Whitebreasted Waterhen, *Amaurornis phoenicurus*.
16. Redwattled Lapwing, *Vanellus indicus*.
17. Fantail Snipe, *Capella gallinago*.
18. Common Green Pigeon, *Treron phoenicoptera*.
19. Grayfronted Green Pigeon, *Treron pompadora*.
20. Jerdon's Imperial Pigeon, *Ducula badia*.
21. Nilgiri Wood Pigeon, *Columba elphinstonii*.
22. Indian Spotted Dove, *Streptopelia chinensis*.
23. Indian Emerald Dove, *Chalcophaps indica*.
24. Blossomheaded Parakeet, *Psittacula cyanocephala*.
25. Bluewinged Parakeet, *Psittacula columboides*.
26. Malabar Lorikeet, *Loriculus vernalis*.
27. Common Hawk-Cuckoo, *Cuculus varius*.
28. Small Greenbilled Malkoha, *Rhopodytes viridirostris*.
29. Crow-Pheasant, *Centropus sinensis*.
30. Collared Scops Owl, *Otus bakkamoena*.
31. Brown Fish Owl, *Bubo zeylonensis*.
32. Brown Wood Owl, *Strix leptogrammica*.
33. Malabar Jungle Owlet, *Glaucidium radiatum*.
34. Hawk-Owl, *Ninox scutulata*.
35. Spotted Owlet, *Athene brama*.
36. Ceylon Frogmouth, *Batrachostomus moniliger*.
37. Indian Jungle Nightjar, *Caprimulgus indicus*.
38. Common Indian Nightjar, *Caprimulgus asiaticus*.
39. Large Brownthroated Spinetail Swift, *Chaetura gigantea*.
40. Malabar Trogon, *Harpactes fasciatus*.
41. Common Kingfisher, *Alcedo atthis*.
42. Brownheaded Storkbilled Kingfisher, *Pelargopsis capensis*.
43. Whitebreasted Kingfisher, *Halcyon smyrnensis*.
44. Chestnutheaded Bee-eater, *Merops leschenaulti*.
45. Bluebearded Bee-eater, *Nyctyornis athertoni*.
46. Indian Roller, *Coracias benghalensis*.
47. Broadbilled Roller, *Eurystomus orientalis*.
48. Hoopoe, *Upupa epops*.
49. Great Indian Hornbill, *Buceros bicornis*.
50. Small Green Barbet, *Megalaima viridis*.
51. Coppersmith, *Megalaima haemacephala*.
52. Speckled Piculet, *Picumnus innominatus*.
53. Rufous Woodpecker, *Micropternus brachyurus*.
54. Small Yellownaped Woodpecker, *Picus chlorolophus*.
55. Goldenbacked woodpecker, *Dinopium benghalense*.
56. Great Black Woodpecker, *Dryocopus javensis*.
57. Yellowfronted Pied Woodpecker, *Dendrocopos mahrattensis*.
58. Pigmy Woodpecker, *Dendrocopos nanus*.
59. Heartspotted Woodpecker, *Hemicircus canente*.
60. Indian Pitta, *Pitta brachyura*.
61. Dusky Crag Martin, *Hirundo concolor*.
62. Eastern Swallow, *Hirundo rustica*.
63. Redrumped Swallow, *Hirundo daurica*.
64. Brown Shrike, *Lanius cristatus*.
65. Blackheaded Oriole, *Oriolus xanthornus*.
66. Black Drongo, *Dicrurus adsimilis*.
67. Whitebellied Drongo, *Dicrurus caeruleascens*.
68. Bronzed Drongo, *Dicrurus aeneus*.
69. Haircrested Drongo, *Dicrurus hottentottus*.
70. Large Racket-tailed Drongo, *Dicrurus paradiseus*.
71. Greyheaded Myna, *Sturnus malabaricus*.
72. Common Myna, *Acridotheres tristis*.
73. Grackle, *Gracula religiosa*.
74. Tree Pie, *Dendrocitta vagabunda*.
75. Southern Tree Pie, *Dendrocitta leucogastra*.
76. House Crow, *Corvus splendens*.
77. Indian Jungle Crow, *Corvus macrorhynchos*.
78. Pied Flycatcher-Shrike, *Hemipus picatus*.

79. Common Wood Shrike, *Tephrodornis pondicerianus*.
80. Blackheaded Cuckoo-Shrike, *Coracina melanoptera*.
81. Orange Minivet, *Pericrocotus flammeus*.
82. Small Minivet, *Pericrocotus cinnamomeus*.
83. Iora, *Aegithina tiphia*.
84. Goldenfronted Chloropsis, *Chloropsis aurifrons*.
85. Fairy Bluebird, *Irena puella*.
86. Rubythroated Bulbul, *Pycnonotus melanicterus gularis*.
87. Redwhiskered Bulbul, *Pycnonotus jocosus*.
88. Redvented Bulbul, *Pycnonotus cafer*.
89. Yellowbrowed Bulbul, *Hypsipetes indicus*.
90. Black Bulbul, *Hypsipetes madagascariensis*.
91. Spotted Babbler *Pellorneum ruficeps*.
92. Scimitar Babbler, *Pomatorhinus schisticeps*.
93. Blackheaded Babbler, *Rhopocichla atriceps*.
94. Rufous Babbler, *Turdoides subrufus*.
95. Jungle Babbler, *Turdoides striatus*.
96. Wynaad Laughing Thrush, *Garrulax delesserti*.
97. Quaker Babbler, *Alcippe poiocephala*.
98. Brown Flycatcher, *Muscicapa latirostris*.
99. Rufous Flycatcher *Muscicapa ruficauda*.
100. Tickell's Blue Flycatcher, *Muscicapa tickelliae*.
101. Greyheaded Flycatcher, *Culicicapa ceylonensis*.
102. Paradise Flycatcher, *Terpsiphone paradisi*.
103. Blacknaped Blue Flycatcher, *Monarcha azurea*.
104. Longtail Warbler, *Prinia hodgsonii*.
105. Plain Longtail Warbler, *Prinia subflava*.
106. Tailor Bird, *Orthotomus sutorius*.
107. Thickbilled Warbler, *Phragmaticola aedon*.
108. Blyth's Reed Warbler, *Acrocephalus dumetorum*.
109. Dull Green Leaf Warbler, *Phylloscopus trochiloides*.
110. Leaf Warbler, *Phylloscopus* sp.?
111. Magpie Robin, *Copsychus saularis*.
112. Malabar Whistling Thrush, *Myiophonus horsfieldii*.
113. Whitethroated Ground Thrush, *Zoothera citrina cyanotus*.
114. Indian Grey Tit. *Parus major*.
115. Yellowcheeked Tit, *Parus xanthogenys*.
116. Velvetfronted Nuthatch, *Sitta frontalis*.
117. Paddyfield Pipit, *Anthus novaeseelandiae*.
118. Forest Wagtail, *Motacilla indica*.
119. Grey Wagtail, *Motacilla caspica*.
120. White Wagtail, *Motacilla alba*.
121. Large Pied Wagtail, *Motacilla maderaspatensis*.
122. Thickbilled Flowerpecker, *Dicaeum agile*.
123. Tickell's Flowerpecker, *Dicaeum erythrorhynchos*.
124. Indian Purplerumped Sunbird, *Nectarinia zeylonica*.
125. Small Sunbird, *Nectarinia minima*.
126. Purple Sunbird, *Nectarinia asiatica*.
127. Little Spiderhunter, *Arachnothera longirostris*.
128. White-eye, *Zosterops palpebrosa*.
129. House Sparrow, *Passer domesticus*.
130. Whitethroated Munia, *Lonchura malabarica*.
131. Rufousbellied Munia, *Lonchura kelaarti*.
132. Spotted Munia, *Lonchura punctulata*.
133. Blackheaded Munia, *Lonchura malacca*.

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